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Patentanwälte

via Fax in advance / 3 pages

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Our Ref.: M/44295-PCT

Re.: **International Patent Application PCT/EP2003/012527**
NUVERA FUEL CELLS EUROPE S.r.l.

In response to the first (rationalised) written opinion of the IPEA dated September 10, 2004

applicant herewith requests

detailed examination.

In the following, preliminary arguments defending patentability of the claimed subject matter in view of prior art cited in the International Search Report are submitted. Should Examiner not be satisfied with the following remarks, applicant requests that a detailed written opinion be issued well before the IPER has to be established to give applicant a chance to specifically respond to substantive objections, if any, raised by the Examiner.

1. The present invention

As indicated in claim 1 as originally filed, the present invention is directed to an electrochemical generator comprised of at least one elementary cell, said cell being provided with a device for feeding reactant gases and a device for extracting the exhaust reactant gases and the reaction product. In order to

increase the efficiency of a gas-fed fuel cell, especially a fuel cell operating at reduced pressure, the invention suggests to provide that the pressure drops localised in the feed device and in the extraction device are asymmetrical.

Thus, firstly, from the wording of claim 1, it is evident that a specific pressure drop is established for each individual cell of a given array of stacked fuel cells.

Secondly, according to the preferred embodiment of claim 2, said pressure drop is largely concentrated at the outlet (discharge channels/manifold) as opposed to the inlet.

Consequently, the generator of the invention takes full taking advantage of the little available relative pressure from the reactant source.

2. Preliminary comments to prior to art

EP-A-0 999 605 is concerned with a completely different problem, namely to provide for a uniform delivery of reactants to the cells of a fuel cell stack although the arrangement of cells in a stack implies some inherent asymmetry (e.g. cells located in the centre of a stack vs. cells located near the extremities where according to the embodiments of figures 5 and 8 outlet and inlet a foreseen). EP'605 suggests to insert wedge members in the inlet and outlet manifold, respectively. From figure 1, however, it is evident that these wedges are oriented in order to increase or decrease the manifold section (and therefore the pressure drop) in the same direction. Thus, while there is a pressure drop between one cell and its neighbouring cell(s), there is no asymmetry of feed versus discharge means as stipulated in present claim 1. Especially, concerning claims 2 and following of the present invention, the fact that a higher pressure drop is concentrated at the cell outlet rather than at the inlet, is not described in EP'605. On the contrary, figure 2 seems to suggest that the cell is provided with grooved flow-field forcing the reactants to move across a fixed path (flow passage 62), while no other element capable of imparting a higher pressure drop is shown downstream the same. One skilled in the art would deduce from figure 2 that the pressure drop is equally distributed along the whole cell path.

US 3,926,676 concerns remote art. Firstly, this document concerns liquid electrolyte fuel cells rather than polymer membrane fuel cells fed with gaseous

reactants. Secondly, the technical problem to be solved by US'676 is to feed an array of cells disposed in parallel by achieving an even flow distribution of liquid electrolyte to each single cell. This is achieved by establishing the same pressure differential between inlet to outlet of each cell. Thus, as both the type of fuel cell described in US'676 and the technical problem discussed in this document differ completely from the present invention, one skilled in the art would not rely on the teaching of US'676 when trying to improve gas fed fuel cells of the present invention. Furthermore, according to US'676, the cross section of the main outlet channel is larger that that of the corresponding inlet channel. Thus, even assuming that the skilled person would consider US'676, its disclosure would at most teach away from the instant invention.

While **GB-A-1 214 359** has correctly be considered as background art in the ISR, the same applies for **US 4,233,146** which again is directed to liquid-fed electrochemical cells. Furthermore, while the present invention is directed to an electrochemical generator, US'146 is concerned with an energy-consuming electrodialysis cell.

It is therefore believed that present claims 1 - 15 are fully patentable over prior art and while present claim 16 is objectable for formal reasons, a favourable IPER with respect to claims 1 - 15 is herewith solicited.

(J. Uwe Müller) hs